

D3.4 Experimental protocol

The i-DREAMS project aims to use simulator and field trials to test the concept of a Safety Tolerance Zone (STZ) and test the i-DREAMS platform. The main goal of this deliverable is to inform the planning, development and finalisation of the simulator and field trials which will be conducted as part of work package (WP) 5 and analysed in WP6. This will include best practices and recommendations towards the experimental protocol, specific to the context of the i-DREAMS project.

In order to test the i-DREAMS platform, risk scenarios will be used as part of the simulator trials. Although there are similarities among the on-road vehicles, there are also differences between them, and between on-road and rail in relation to target risks. These differences need to be taken in consideration when designing the high-risk scenarios and therefore scenarios will be tailored for each transport mode and vehicle type. A series of risk factors, environments, events, conditions and data are to be used for the scenarios, focused on specific target risks for each mode. As these trials will occur across five different countries in four transport modes, it is important that a standard protocol is developed to ensure consistency in testing.

Information and content from D5.1, 'Simulator and field study organisation and support', is updated in this deliverable. An expanded and detailed methodology for the simulator and field trials will be the core of subsequent deliverables D5.2 and D5.3.

Hi Fran, if I understand correctly you tried to create a standard protocol for testing that can be applied in the simulator and field trials in the 5 different countries. What is the first thing you focused on when trying to realise this?

FRAN PILKINGTON-CHENEY: *"We first focused on the simulator trials and provided an overview of the design principles that should be considered. This is quite complex since the principles regarding experimental design relate to various things such as technological factors (e.g. characteristics of simulator devices), organisational factors (e.g. recruiting strategies), human factors (e.g. simulator sickness and carryover effects), statistical and analytical factors (e.g. confounders, sample size and statistical power) and so forth. We provided an overview of guidelines for designing driving simulator experiments in i-DREAMS, but a more detailed description and exhaustive guidelines for implementation will be provided in one of the next deliverables (namely D5.2)."*

Besides these design principles I also read that you developed high-risk scenarios to test in the simulators. What exactly do you mean when you are talking about high-risk scenarios?

FRAN PILKINGTON-CHENEY: *"A scenario describes the traffic situations that a driver will encounter when driving in the simulator. Several (high) risk scenarios and events will be developed per mode for the different driving simulators. The content of the scenarios will depend on the transport mode under investigation."*



What different types of simulators do you have in the consortium?

FRAN PILKINGTON-CHENEY: *“We used car simulators in Germany and Greece for the passenger car trials. We have large vehicle simulators in Belgium and Portugal that we use for truck and bus simulator trials and in the UK we have access to tram simulators.”*

You mentioned that the target risks, events, environments and conditions can differ in the scenarios that are tested, depending of the transport mode. Can you illustrate this with an example to make it more concrete?

FRAN PILKINGTON-CHENEY: *“Of course! For the car we foresee scenarios where we test in urban, rural and highway environments, but truck drivers will mainly drive scenarios outside city centres (on rural and highway environments). Test scenarios for trucks will focus on forward collision avoidance, with sleepiness as an additional condition. But for cars, more risk factors are included in the scenarios. Besides forward collision avoidance, there will be focus on vulnerable road user detection, illegal overtaking, distraction and bad weather conditions. What I meant to say is that we made some deliberate decisions per mode. It would take too long to go into all of the choices we made and why we made them ... but if you are interested, you can read all about it in the deliverable.”*



Car simulator
Germany & Greece



Bus simulator
Portugal



Truck simulator
Belgium



Tram simulator
United Kingdom



Besides simulator tests, i-DREAMS will also be tested during field trials. How will you go from the simulator tests to the field trials?

FRAN PILKINGTON-CHENEY: *“After the testing in the simulator, the i-DREAMS system will be installed in the four transport modes¹. After vehicle instrumentation we will organise pilot tests for all modes. The same drivers will be engaged in the baseline and the intervention stages. However, we will use different participants in both the simulator and the pilot on-road testing so as not to influence the results. During these pilot on-road tests we will try to improve the procedure, resulting in a checklist that describes all the steps of a successful field trial.”*

Can you give us an insight in what those steps are exactly?

FRAN PILKINGTON-CHENEY: *“Well, you can consider the checklist as some sort of a script that every test site needs to follow to get the show on the road and to successfully complete it. This script starts with describing all the actions to be taken during the planning of the field trial. These actions are about preparing recruitment and legal, ethical, technical and operational aspects. Furthermore, the recruitment phase itself is described, elaborating on how to select participants and foreseeing back-up plans. The next part of the script is about the execution of the field trials, detailing how to handle participants and how to manage dropouts. Finally, the script focuses on the steps that describe the de-installation of the technology and the de-briefing of the participants.”*

¹ Due to operational constraints, the i-DREAMS technology was not tested in the field for rail modes

The selection and recruitment of participants is one of the most important aspects in planning a study. How do you plan to handle this?

FRAN PILKINGTON-CHENEY: *“We actually devoted an entire chapter to it in this deliverable: chapter 5. We provide guidance and recommendations for sampling considerations, recruitment strategies, participant screening and participant retention.”*

Can you elaborate a bit further on what this entails?

FRAN PILKINGTON-CHENEY: *“In i-DREAMS, we did a nonprobability sampling strategy. This means that the population is not completely known, so the sampling method is based on factors such as convenience or ease of access, with an effort to maintain representativeness and avoid bias. Participant selection criteria relate to driving experience, age and gender, multi-driver access to vehicles and environmental exposure (urban, rural, highways). The vehicle criteria relate mainly to different makes or types of vehicles, manual/automated transmission. For buses, we include city traffic and coaches, for trucks: long-haul vehicles and vehicles for city/local distribution are considered.*

The sample and legal and ethical requirements are different in each country. Each partner will be responsible for developing a tailored recruitment strategy that best fits the needs of their country and sample in order to recruit the desired number of participants for the simulator and field trials. Participant screenings will occur via a series of questions to determine whether a participant is eligible. In order to minimise dropouts, a participant management strategy based on the identified recommendations from previous studies is



developed for the simulator and field trial experiments. This includes a reserve list of participants who are interested in participating. It is proposed that if participants drop out in the first three weeks of the intervention phase, then they will be replaced (where possible).

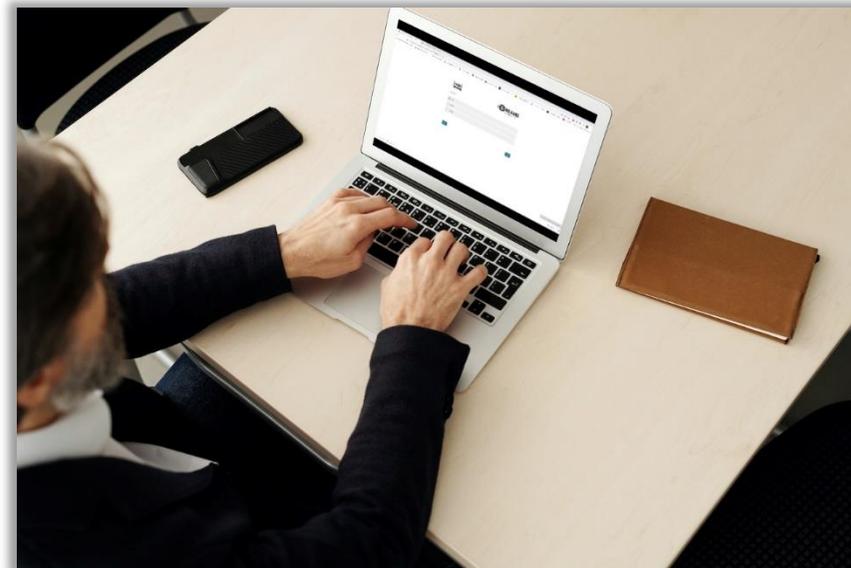
The incentive strategy aims to further reduce the dropout rate. The incentives will be managed locally by the partner in each country, as the legal aspects for receiving incentives differ from country to country (e.g. field trial car participants in Belgium receive €250 in case of a full participation). Some general rules are followed by all the test sites: participants of the simulator trials for passenger cars receive an incentive in the form of a gift voucher, as their participation is limited to just one drive in the driving simulator. For professional drivers, this is dependent on specific recruitment strategy and company policy. Participants who take part in the pilot field trials will not receive an incentive.”

I read in the report that some extra information from the participants is collected via a few questionnaires. Why did you do that?

FRAN PILKINGTON-CHENEY: “We actually asked participants to complete an entry questionnaire at the start of their participation and a technology acceptance questionnaire at the end. The recruited participants are a diverse group of drivers, differing not only in nationality but also in a range of characteristics relevant for safe driving and interacting with the i-DREAMS intervention system. It is crucial to collect additional information from participants in order to consider these varying characteristics during the analysis and reporting of the results. This information will ultimately contribute to improving the i-DREAMS platform by either refining the STZ calculation, allowing for validation of inter-individual differences in the real-time measures or by facilitating the customisation of interventions. This therefore applies to all stages of the trials.”

And what type of information did you collect via these extra questionnaires?

FRAN PILKINGTON-CHENEY: “Apart from the more obvious socio-demographic and basic driving variables such as age, gender, driving experience and attainment of the driving license, etc., certain additional topics were covered, including competencies, personality traits, habitual driving behaviour, and health conditions and factors. While factors such as age or years of experience can simply be queried, latent constructs such as sensation seeking (personality) for example are inferred by applying validated, standardised scales which result in a score. Both types of questions were included in the questionnaires.”



Completing the entry questionnaire (before the start of the experiment)



What about the legal requirement for conducting the simulator and field trials. Did you do any work on that in this deliverable?

FRAN PILKINGTON-CHENEY: *“Most of that work was already detailed in deliverable D5.1, so in this deliverable we only looked at the additional elements, relevant to the on-going development of the simulator and field trials. This mostly resulted in making explicit the need for professional fitting of the equipment, the creation of a project fact sheet detailing equipment, who to contact etc. to keep in the glovebox in case a participant is stopped and needs to explain the data, and a few extra requirements for specific countries. Of course, compliance with GDPR regulations also needed to be guaranteed in all test sites. Before starting any trials, each trial partner had to obtain their institutions ethical approval.”*

What do you feel is the most important conclusion to be drawn from this deliverable?

FRAN PILKINGTON-CHENEY: *“This report offers a lot of guidance to help streamline simulator and field trials across test sites, but it is important to remember that those guidelines definitely need further detailing. And those details will be developed further in D5.2 for simulator trials and D5.3 for field trials. It is important that stages outlined in the checklists are followed, ethical and legal issues are resolved before the start of participant recruitment, scenarios for simulator trials are tailored to each transport mode and the i-DREAMS platform is tested prior to the field trials. Realistic timelines need to be foreseen alongside the checklists to ensure no stages are missed.”*

Thank you for your time Fran. I wish you all the best!

Edith Donders

i-DREAMS DisCom manager

Deliverable 3.4 is part of WP3:
Operational design of i-DREAMS

[Download the report here](#)

Researcher in the spotlight



**FRAN
PILKINGTON-CHENEY**

Graduated with BSc in Psychology in 2010, PhD in 2021 in sleep research, exploring how individuals manage their sleepiness

Employed at Loughborough University as a Research Associate 2018-2022. Now work at Nottingham Trent University as a lecturer in Psychology and Sleep since 2022.

Passionate about reading, history, horse riding, cats, cricket and F1

Tasks in i-DREAMS: lead for the fatigue section of WP2 (review of literature), lead of D3.4 (organisation, reviewing and submitting the deliverable), developing the fatigue and sleepiness intervention strategy, and assistance in WP5

